AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. (previously presented): A method of extracting a specified image subject which successively implements a plurality of specified image subject extracting algorithms, comprising the steps of:

implementing an extracting algorithm of a precedent stage under a predetermined extracting condition to obtain an extraction result;

changing an extracting condition of a subsequent stage so as to be adapted to the thus obtained extraction result; and

implementing an extracting algorithm of said subsequent stage under the thus changed extracting condition,

wherein said precedent stage comprises extracting a shape of regular geometric form of the specified image subject.

2. (previously presented): A method of extracting a specified image subject which implements a plurality of specified image subject extracting algorithms in each stage of a plurality of stages by means of parallel processing, comprising the steps of:

managing respective extracting states of said plurality of specified image subject extracting algorithms in said each stage;

qualifying respective extraction processing conditions of said plurality of specified image subject extracting algorithms in a subsequent stage according to the respective extracting states in a precedent stage; and

implementing said plurality of specified image subject extracting algorithms of said subsequent stage under the thus qualified respective extraction processing conditions by means of parallel processing,

wherein said precedent stage comprises extracting a shape of regular geometric form of the specified image subject.

3. (original): The method of extracting the specified image subject according to claim 2, wherein said respective extraction processing conditions are areas to be subjected to extraction processing when implementing said plurality of specified image subject extracting algorithms of said subsequent stage.

4. (original): The method of extracting the specified image subject according to claim 2, wherein said respective extraction processing conditions are types of extracting algorithms to be implemented at said subsequent stage.

5. (original): The method of extracting the specified image subject according to claim 2, wherein said respective extraction processing conditions are control parameters inside extracting algorithms to be implemented in said subsequent stage.

6. (original): The method of extracting the specified image subject according to claim 2, wherein said plurality of specified image subject extracting algorithms to be implemented by means of parallel processing in said each stage are of same combination in said plurality of stages.

7. (original): The method of extracting the specified image subject according to claim 2, wherein said plurality of specified image subject extracting algorithms to be implemented by means of parallel processing in said each stage are of different combination in said plurality of stages.

8. (previously presented): A device for extracting a specified image subject, comprising:

a plurality of stages of image subject extraction processing units for successively performing a plurality of specified image subject extracting algorithms, respectively; and

an extracting condition change control unit for adaptively changing an extracting condition in an image subject extraction processing unit of a subsequent stage in accordance with an image subject extraction result by the image subject extraction processing unit of a precedent stage,

wherein said precedent stage comprises extracting a shape of regular geometric form of the specified image subject.

9. (previously presented): A device for extracting a specified image subject, comprising:

a plurality of stages of image subject extraction parallel processing units, each image subject extraction parallel processing unit for implementing a plurality of specified image subject extracting algorithms in each stage of said plurality of stages by means of parallel processing; and

a control unit for managing respective image subject extraction states of said plurality of specified image subject extracting algorithms in each stage by said each image subject extraction parallel processing unit of said image subject extraction parallel processing units and qualifying respective extraction processing conditions of said plurality of specified image subject extracting algorithms in a subsequent stage of an image subject extraction parallel processing unit according to the respective image subject extraction states by the precedent stage of the image extraction parallel processing unit,

wherein said precedent stage comprises extracting a shape of regular geometric form of the specified image subject.

10. (original): The device for extracting the specified image subject according to claim 9, wherein said control unit qualifies areas to be subjected to extraction processing in said subsequent stage of said image subject extraction parallel processing unit as said respective extraction processing conditions.

11. (original): The device for extracting the specified image subject according to claim 9, wherein said control unit qualifies types of extracting algorithms to be implemented in

said subsequent stage of said image subject extraction parallel processing unit as said respective extraction processing conditions.

12. (original): The device for extracting the specified image subject according to claim 9, wherein said control unit qualifies control parameters inside extracting algorithms to be implemented by said subsequent stage of said image subject extraction parallel processing unit as said respective extraction processing conditions.

13. (original): The device for extracting the specified image subject according to claim 9, wherein said image subject extraction parallel processing unit implements said plurality of specified image subject extracting algorithms with same combination in each stage of said plurality of stages by means of parallel processing.

14. (original): The device for extracting the specified image subject according to claim 9, wherein said image subject extraction parallel processing unit implements said plurality of specified image subject extracting algorithms with different combination in each stage of said plurality of stages by means of parallel processing.

15. (currently amended): A method of extracting a specified image subject, comprising the steps of:

performing image subject extraction processing by a specified image subject extracting algorithm or algorithms for each extraction area to extract a plurality of extraction areas as candidate specified image subject regions;

performing a vote in an N-dimensional space of an image characteristic quantity for each extraction area extracted by said specified image subject extracting algorithm or algorithms; and

performing weighting of degree of certainty as a specified image subject based on an aggregation value of the vote within a section area for aggregation in said N-dimensional space,

wherein a first extraction area is extracted according to a shape of regular geometric form of the specified image subject.

16. (original): The method of extracting the specified image subject according to claim 15, wherein said image subject extraction processing by said specified image subject extracting algorithm or algorithms is performed through dividing it into a plurality of stages; and

said image subject extraction processing in a subsequent stage is preferentially applied to an extraction area in which said aggregation value in the voting space of said image characteristic quantity exceeds a predetermined value.

17. (original): The method of extracting the specified image subject according to claim 15, wherein said specified image subject extraction processing by said specified image subject extracting algorithm or algorithms is performed through dividing it into a plurality of stages; and said image subject extraction processing in a subsequent stage is preferentially applied to an extraction area corresponding to said section area for aggregation within a preferential frame in the voting space of said image characteristic quantity.

18. (original): The method of extracting the specified image subject according to claim 15, wherein a combination of a plurality of image characteristic quantities selected from

the group consisting of a position, size, direction or orientation of an extraction area and, a posture, density or color tint of an image subject is used as the N-dimensional space of said image characteristic quantity.

19. (original): The method of extracting the specified image subject according to claim 15, wherein weighting value lowering processing is applied to a region within a predetermined area on a specific characteristic axis with respect to a neighborhood of the region, in which said aggregation value became large, in said N-dimensional characteristic stage.

20. (original): The method of extracting the specified image subject according to claim 19, wherein application of said weighting value lowering processing is processing to remove a remarkably large size or a remarkably small size from extraction data.

21. (previously presented): A device for extracting a specified image subject, comprising:

an image subject extraction processing unit for implementing a specified image subject extracting algorithm or algorithms; and

a weighting processing unit for performing a vote in an N-dimensional space of image characteristic quantity for each extraction area extracted by said image subject extraction processing unit and performing weighting of degree of certainty as the specified image subject based on an aggregation value of the vote within a section area for aggregation in said N-dimensional space,

wherein a first extraction area is extracted according to a shape of regular geometric form of the specified image subject.

22. (original): The device for extracting the specified image subject according to claim 21, wherein said image subject extraction processing unit performs the image subject extraction processing in a plurality of divided stages and applies the image subject extraction processing in a subsequent stage preferentially to an extraction area in which said aggregation value in the voting space of said image characteristic value exceeds a predetermined value.

23. (original): The device for extracting the specified image subject according to claim 21, wherein said image subject extraction processing unit performs the image subject extraction processing through dividing it into a plurality of stages, and applies the image subject extraction processing in a subsequent stage preferentially to an extraction area corresponding to said section area for aggregation within a preferential frame in the voting space of said image characteristic quantity.

24. (original): The device for extracting the specified image according to claim 21, wherein a combination of a plurality of image characteristic quantities selected from the group consisting of a position, size, direction or orientation of an extraction area, and a posture, density or color tint of an image subject is used as the N-dimensional space of said image characteristic quantity.

25. (original): The device for extracting the specified image according to claim 21, wherein said weighting processing unit applies weighting value lowering processing to a region

within a predetermined area on a specific characteristic axis with respect to a neighborhood of the region, in which said aggregation value became large, in said N-dimensional characteristic stage.

26. (original): The device for extracting the specified image subject according to claim 25, wherein application of said weighting value lowering processing is processing to remove a remarkably large size or a remarkably small size from extraction data.

27. (previously presented): The device for extracting a specified image subject according to claim 8, wherein said precedent stage comprises extracting a shape of the specified image subject, and

wherein said subsequent stage comprises detecting a color or hue of the specified image subject.

28. (previously presented): The method of extracting a specified image subject according to claim 1, wherein said predetermined extracting condition comprises electronic flash or backlight information.

29. (previously presented): The device for extracting a specified image subject according to claim 8, wherein said predetermined extracting condition comprises electronic flash or backlight information.

30. (previously presented): The method of extracting a specified image subject according to claim 2, wherein said extraction processing conditions comprise electronic flash or backlight information.

31. (previously presented): The device for extracting a specified image subject according to claim 9, wherein said extraction processing conditions comprise electronic flash or backlight information.

32. (previously presented): The device for extracting a specified image subject according to claim 9, wherein the plurality of specified image subject extracting algorithms in each stage of the plurality of stages are implemented at a same time.

33. (previously presented): The method of extracting a specified image subject according to claim 2, wherein the plurality of specified image subject extracting algorithms in each stage of the plurality of stages are implemented at a same time.

34. (previously presented): The device for extracting a specified image subject according to claim 9, wherein said image subject extraction parallel processing units comprises:

skin color extraction, face contour extraction, hair-on-head extraction, eye/nose/mouth/eyebrow extraction, body extraction, and non-background area extraction.

35. (previously presented): The method of extracting a specified image subject according to claim 2, wherein said image subject extraction parallel processing units comprises:

skin color extraction, face contour extraction, hair-on-head extraction, eye/nose/mouth/eyebrow extraction, body extraction, and non-background area extraction.

36. (previously presented): The device for extracting a specified image subject according to claim 9, wherein said algorithms comprise different degrees of resolution.

37. (previously presented): The method of extracting a specified image subject according to claim 2, wherein said algorithms comprise different degrees of resolution.

38. (previously presented): The method of extracting a specified image subject according to claim 15, wherein said vote comprises an aggregation of points indicative of the specified image subject.

39. (previously presented): The device of extracting a specified image subject according to claim 21, wherein said vote comprises an aggregation of points indicative of the specified image subject.

40. (previously presented): A method of extracting a specified image subject according to claim 1, wherein said subsequent stage comprises detecting a color or hue of the specified image subject.

41. (previously presented): A method of extracting a specified image subject according to claim 1, wherein said regular geometric form is circular or elliptical.

42. (previously presented): A method of extracting a specified image subject according to claim 2, wherein said regular geometric form is circular or elliptical.

43. (previously presented): A device for extracting a specified image subject according to claim 8, wherein said regular geometric form is circular or elliptical.

44. (previously presented): A device for extracting a specified image subject according to claim 9, wherein said regular geometric form is circular or elliptical.

45. (previously presented): A method of extracting a specified image subject according to claim 15, wherein said regular geometric form is circular or elliptical.

46. (previously presented): A device for extracting a specified image subject according to claim 21, wherein said regular geometric form is circular or elliptical.

47. (new): A method of extracting a specified image subject according to claim 1, wherein the step of implementing the extracting algorithm of the precedent stage under the predetermined extracting condition to obtain the extraction result is performed before changing the extracting condition of the subsequent stage so as to be adapted to the thus obtained extraction result.

48. (new): The method of extracting the specified image subject according to claim 1, wherein said extracting algorithm of said precedent stage is a face contour extracting algorithm which extracts a plurality of candidate regions of a human face estimated to represent a human face, and said extracting algorithm of said subsequent stage is a skin color detection algorithm which extracts a skin color with a predetermined skin color extracting condition of skin color,

wherein said skin color detection algorithm judges a skin color of a candidate region having a high probability of being a human face out of the plurality of candidate regions based on a skin color extracting condition which is set less strict than said predetermined skin color extracting condition.

49. (new): The method of extracting the specified image subject according to claim 48, wherein said skin color extracting condition is set less strict by means of broadening a skin color definition region or moving the skin color definition region into a region close to gray.

50. (new): The method of extracting a specified image subject according to claim 1, wherein said extracting algorithm of said precedent stage is a face contour extracting algorithm which extracts a plurality of candidate regions of a human face estimated to represent the human face by edge detection processing using a first threshold value, and

wherein said subsequent stage includes extracting face composing elements for each candidate region by the edge detection processing using a second threshold value which is set in a lower side than the first threshold value.

51. (new): The method of extracting a specified image subject according to claim 1, wherein said subsequent stage comprises the steps of:

implementing a clustering algorithm by means of color or density within an area corresponding to said shape of regular geometric form of the specified image subject to divide said area into a plurality of areas;

determining an image characteristic quantity of each of the thus divided areas; and

judging the specified image subject based on the image characteristic quantity.

52. (new): A method of extracting a specified image subject according to claim 2, wherein said qualifying respective extraction processing conditions of said plurality of specified

image subject extracting algorithms in the subsequent stage is performed after the respective extracting states in the precedent stage.

53. (new): A device for extracting a specified image subject, according to claim 8, wherein the extracting condition change control unit for adaptively changing the extracting condition in the image subject extraction processing unit of the subsequent stage is performed after the extraction of the image subject extraction result by the image subject extraction processing unit of the precedent stage.

54. (new): A device for extracting a specified image subject, according to claim 9, wherein the control unit for managing respective image subject extraction states of said plurality of specified image subject extracting algorithms in each stage by said each image subject extraction parallel processing unit of said image subject extraction parallel processing units and qualifying respective extraction processing conditions of said plurality of specified image subject extracting algorithms in the subsequent stage of the image subject extraction parallel processing unit is performed after the extraction of the respective image subject extraction states by the precedent stage of the image extraction parallel processing unit.

55. (new): The device for extracting the specified image subject according to claim 10, wherein said control unit checks a degree of a overlap of each of candidate areas of said specified image subject which is extracted by a plurality of said specified image subject extracting algorithm, qualifies a candidate area in which the degree of the overlap exceeds a

predetermined value as being said areas, and controls said image subject extraction parallel processing units to extract a undetected related information.

56. (new): The device for extracting the specified image subject according to claim 11, wherein said control unit checks composing elements of a specified image subject extracted by a plurality of the specified image subject extracting algorithms, and qualifies the types of extracting algorithms to be implemented in said subsequent stage to extract undetected other composing elements.

57. (new): A method of extracting a specified image subject according to claim 15, wherein the steps are performed in the order of:

performing image subject extraction processing by the specified image subject extracting algorithm or algorithms for each extraction area;

performing the vote in the N-dimensional space of the image characteristic quantity for each extraction area extracted by said specified image subject extracting algorithm or algorithms; and

performing weighting of degree of certainty as the specified image subject based on the aggregation value of the vote within the section area for aggregation in said N-dimensional space.

58. (new): The method of extracting the specified image subject according to claim 15, wherein said each extraction area is extracted by plural types of specified image subject extracting algorithms.

59. (new): The method of extracting the specified image subject according to claim 15, wherein said each extraction area is extracted by same specified image subject extracting algorithm with a multistage parameter.

60. (new): The method of extracting the specified image subject according to claim 15, including the steps of:

performing edge detection processing and binarization processing to obtain edges;

extracting a figure from lines of a contour which is obtained by performing a trace based on the edges; and

setting the figure as a candidate region which has a high probability of being a human face.

61. (new): The device for extracting a specified image subject according to claim 21, wherein the first extraction area is extracted before the extraction of the remaining each of the extraction areas.